

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

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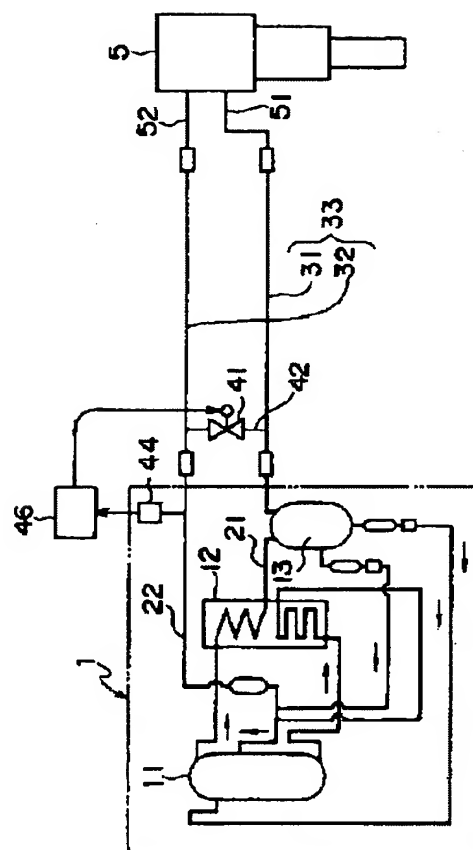
APPLICATION DATE : 25-07-00  
APPLICATION NUMBER : 2000223700

APPLICANT : DAIKIN IND LTD;

INVENTOR : FUJIWARA KENJI;

INT.CL. : F25B 9/00 F25B 9/14

TITLE : CRYOGENIC FREEZER



ABSTRACT : PROBLEM TO BE SOLVED: To provide a cryogenic freezer which can be installed easily.

SOLUTION: In the main line 33 for connecting an outdoor compressor unit 1 which has a compressor 11 and a heat exchanger 12 with a cryogenic expander 5, the supply pipe 31 and the return pipe 32 of the main line 33 are connected with each other by connection pipe 42 wherein an electrically operated valve 41 is interposed. A controller 46 controls the electrically operated valve 41 so that helium may flow at a specified flow rate to the cryogenic expander 5, based on the length and shape of the main line 33 and the helium gas pressure on the suction side of the compressor 11. By doing it so, there is no necessity to compute the charge pressure corresponding to the length and shape of the main line 33 and charge a freezer with helium gas so that it may come to the charge pressure when the user installs the cryogenic freezer, so the installation work of the cryogenic freezer can be facilitated.

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CLAIMS

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[Claim(s)]

[Claim 1] In the very-low-temperature freezer which connected the very-low-temperature expander (5) with the outdoor compressor unit (1) which has a compressor (11) and a heat exchanger (12) by the mainline (33) which consists of a supply pipe (31) and a return pipe (32) While connecting between the supply pipe (31) of the above-mentioned mainline (33), and return pipes (32) The pressure sensor which detects the pressure of the communication trunk (42) in which the motor-operated valve (41) was interposed, and the refrigerant gas which the compressor (11) of the above-mentioned outdoor compressor unit (1) inhales (44), The very-low-temperature freezer characterized by having the control means (46) which adjusts the opening of the above-mentioned motor-operated valve (41) based on at least one of the die length of the above-mentioned mainline (33), and the configurations, and the pressure detected by the above-mentioned pressure sensor (44).

[Claim 2]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the very-low-temperature freezer which used refrigerant gases, such as helium.

[0002]

[Description of the Prior Art] Conventionally, as this kind of a very-low-temperature freezer, there is a thing as shown in drawing 3 . This very-low-temperature freezer is constituted by the outdoor compressor unit 1 arranged on the outdoors, and the very-low-temperature expander 5 arranged indoors.

[0003] The above-mentioned outdoor compressor unit 1 consists of a compressor 11 for gaseous helium, a heat exchanger 12 infixed in the discharge-side piping 21 of this compressor 11, and an oil separator 13 interposed in the discharge-side piping 21 in the outlet side of this heat exchanger 12. The gas return pipe 32 is connected to the point of the inlet-side piping 22 which connects a gas supply line 31 to the point of the above-mentioned discharge-side piping 21 connected to the discharge side of the above-mentioned compressor 11, and is connected to the inlet side of the above-mentioned compressor 11. The above-mentioned gas supply line 31 is connected to the high-tension-side interunit piping 51 which is open for free passage to the very-low-temperature expansion machine 5, and the above-mentioned gas return pipe 32 is connected to the low-tension side interunit piping 52 which is open for free passage to the above-mentioned very-low-temperature expansion machine 5. The outdoor compressor unit 1 which forms a mainline 33 with the above-mentioned gas supply line 31 and the gas return pipe 32, arranges this mainline 33 to the underpart of the roof of a building etc., and is arranged on the outdoors, and the very-low-temperature expander 5 arranged indoors are connected.

[0004] In the very-low-temperature freezer of the above-mentioned configuration, after carrying out heat exchange to outdoor air and being cooled in a heat exchanger 12, the gaseous helium of elevated-temperature high pressure compressed with the compressor 11 of the above-mentioned outdoor compressor unit 1 is removed by the oil separator 13 in an oil, and is led to the very-low-temperature expansion machine 5 through the discharge-side piping 21, a gas supply line 31, and high-tension-side interunit piping 51. And it connects with the low pressure chamber which is not illustrated, the high-pressure gaseous helium cooled by the cold reserving material which is not illustrated within the very-low-temperature expander 5 expands at a stretch, and gas temperature falls. The gaseous helium which expanded within the above-mentioned very-low-temperature expander 5 is discharged from the very-low-temperature expander 5 through low-tension side interunit piping 52, and he is trying to return to the inlet side of a compressor 11 through the gas return pipe 32 and the inlet-side piping 22. Gaseous helium circulates through such a frozen path, cold energy is accumulated in the cold reserving material which was prepared in the above-mentioned very-low-temperature expander 5 and which is not illustrated, and very low temperature is acquired in the very-low-temperature freezer 5.

[0005]

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the very-low-temperature freezer which used refrigerant gases, such as helium.

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PRIOR ART

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[Description of the Prior Art] Conventionally, as this kind of a very-low-temperature freezer, there is a thing as shown in drawing 3 . This very-low-temperature freezer is constituted by the outdoor compressor unit 1 arranged on the outdoors, and the very-low-temperature expander 5 arranged indoors.

[0003] The above-mentioned outdoor compressor unit 1 consists of a compressor 11 for gaseous helium, a heat exchanger 12 infixed in the discharge-side piping 21 of this compressor 11, and an oil separator 13 interposed in the discharge-side piping 21 in the outlet side of this heat exchanger 12. The gas return pipe 32 is connected to the point of the inlet-side piping 22 which connects a gas supply line 31 to the point of the above-mentioned discharge-side piping 21 connected to the discharge side of the above-mentioned compressor 11, and is connected to the inlet side of the above-mentioned compressor 11. The above-mentioned gas supply line 31 is connected to the high-tension-side interunit piping 51 which is open for free passage to the very-low-temperature expansion machine 5, and the above-mentioned gas return pipe 32 is connected to the low-tension side interunit piping 52 which is open for free passage to the above-mentioned very-low-temperature expansion machine 5.

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EFFECT OF THE INVENTION

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[Effect of the Invention] As mentioned above, according to the very-low-temperature freezer of invention of claim 1, so that clearly Since it has the control means which controls the motor-operated valve interposed in the communication trunk which connects the supply pipe and return pipe of a mainline based on the die length of a mainline, at least one of the configurations, and the refrigerant gas pressure in the inlet side of a compressor Corresponding to the die length and the configuration, and refrigerant gas pressure of the above-mentioned mainline, the refrigerant gas of a predetermined flow rate can be passed to a very-low-temperature expander. Therefore, in case a very-low-temperature freezer is installed, it does not need to be filled up with a refrigerant gas so that it may become a filling pressure based on the die length and the configuration of a mainline, and installation of a very-low-temperature freezer can be made easy.

[0024] According to the very-low-temperature freezer of invention of claim 2, the die length of a mainline, and at least one of the configurations

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, whenever the above-mentioned conventional very-low-temperature freezer installs a very-low-temperature freezer, it calculates a filling pressure based on the die length, the angle of bend, and the number of crookedness of a mainline 33, and being filled up with gaseous helium so that it may become the filling pressure has the problem of taking time and effort very much.

[0007] Then, the purpose of this invention is not to set up the filling pressure of gaseous helium according to the die length or the configuration of a mainline at the time of installation of a very-low-temperature freezer, and offer the very-low-temperature freezer which can be installed easily.

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MEANS

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[Means for Solving the Problem] In order to attain the above-mentioned purpose, the very-low-temperature freezer of invention of claim 1 In the very-low-temperature freezer which connected the outdoor compressor unit which has a compressor and a heat exchanger, and the very-low-temperature expander by the mainline which consists of a supply pipe and a return pipe, while connecting between the supply pipe of the above-mentioned mainline, and return pipes The communication trunk in which the motor-operated valve was interposed, and the pressure sensor which detects the pressure of the refrigerant gas which the compressor of the above-mentioned outdoor compressor unit inhales,



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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the refrigerant circuit Fig. showing the very-low-temperature freezer in the 1st operation gestalt of this invention.

[Drawing 2] It is the refrigerant circuit Fig. of the very-low-temperature freezer in the 2nd operation gestalt of this invention.

[Drawing 3] It is the refrigerant circuit Fig. of the conventional very-low-temperature freezer.

[Description of Notations]

1 Outdoor Compressor Unit

5 Very-Low-Temperature Expander

11 Compressor

12 Heat Exchanger

13 Oil Separator

21 Discharge-Side Piping

22 Inlet-Side Piping

31 Gas Supply Line

32 Gas Return Pipe

33 Mainline

41 Motor-operated Valve

42 Communication Trunk

44 Pressure Sensor

46 Control Unit

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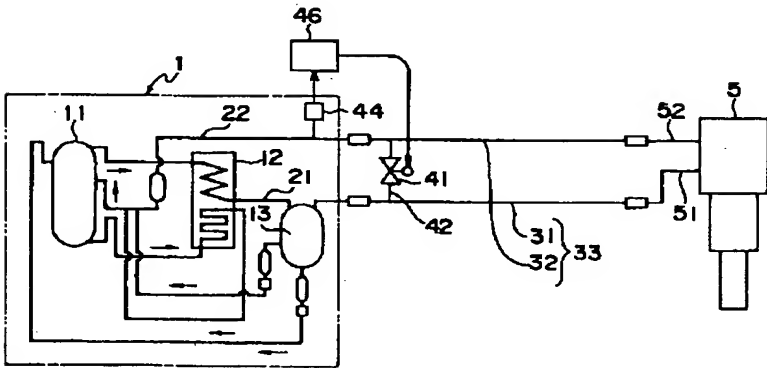
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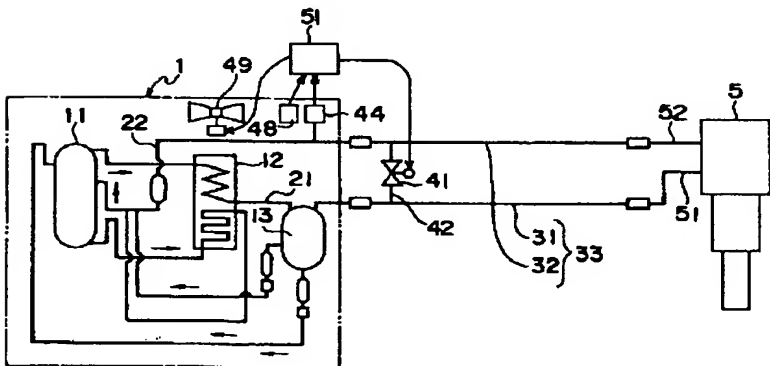
DRAWINGS

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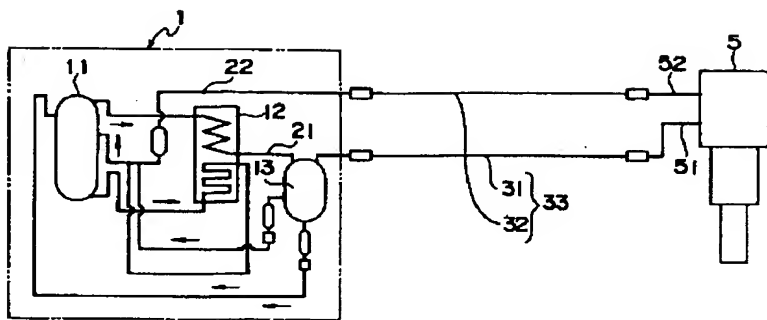
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]